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Abstract: This paper will look at the use and regulation of biosolids on farmland in America. I will detail the history behind biosolids and its utilization as fertilizer. I will also examine the scant legislative oversight over this industry, and demonstrate why the federal government should do more to regulate biosolids in the interest of public health and general well-being. Special attention will be given to California, including a detailed description from one Californian farmer on his sludge-farming experience.

Regulate This: The Politics and Practice of
Poo Farming

by

Vonn R. Christenson

“The smell of money.” That’s what my grandfather used to call the powerful odors that emanate from the many large dairies in California near my home town. And my grandfather wasn’t joking, either. Milk is California’s biggest agricultural “cash cow,” bringing in over \$5.3 billion in 2004¹ from over 3 million cows.² And we unfortunately cannot have milk without cows and their manure in all of its pungent glory. Hence the smell of money.

With such a history of aromatic business ventures, one might think that Californians would be indifferent to other smelly situations as long as they turn a profit. However, residents of Kern County are all up in a stink over the most recent “product” which is quite literally turning their land into the region’s toilet. I present to you the American sludge farm. Biosolids. Human waste. Sewage. Sludge. You know -- the stuff that is flushed down toilets, washed down drains, and rained down gutters on its way to the sewers. When properly treated that “stuff” can become nutrient-rich fertilizer to help restore otherwise depleted soil.

It’s all part of that wonderful process of life: we grow plants, which we eat, which we void,

¹See California Agricultural Overview, California Agricultural Resource Directory 2005, at 18, at <<http://www.cdfa.ca.gov/card/pdfs/2cdfagovstat.pdf>> (last visited May 17, 2006).

²See Edie Lau, *Cows Get Whiff of Vindication in Smog Study*, SACRAMENTO BEE, Jan. 27, 2005.

which becomes food for new plants, which we eat, and so on. It may be an unsavory business, but it nonetheless happens every day (multiple times even for some people).

This paper will look at the use and regulation of biosolids on farmland in America. I will detail the history behind biosolids and its utilization as fertilizer. I will also examine the scant legislative oversight over this industry, and demonstrate why the federal government should do more to regulate biosolids in the interest of public health and general well-being. Special attention will be given to California, including a detailed description from one Californian farmer on his sludge-farming experience.

Introduction to the Use and Regulation of Biosolids in the U.S.

Night soil, as human waste used to be called, has been used for centuries as a soil enhancer. Mariners would use their waste to help grow small plants for fresh fruit while on long voyages.³ However, as people became aware of the health hazards associated with human feces, then its use as fertilizer grew unpopular.

American sewage sludge concerns started on New Jersey's shoreline in 1987.⁴ For years, many large cities had legally discharged their sewage and other waste into the ocean. As a consequence, sewage slicks began appearing on the New Jersey shore. The headlines were horrific. Medical syringes and used condoms appeared in sand castles. Beachgoers stayed away in droves as authorities reported the coastline and inlets were laced with bacteria from the sewage.⁵

³See Using Human Manure ("Nightsoil") in the Tai Lake Region of China, Agroecology Research Group, at <<http://www.agroecology.org/cases/nightsoil.htm>> (last visited May 17, 2006).

⁴See Mark Grossi, *Waste to a Wasteland*, FRESNO BEE, June 13, 2004, at A1.

⁵*Id.*

Congress didn't wait for more headlines. In 1988, congressional members passed a law prohibiting cities from dumping sewage into the ocean.⁶ It took effect in 1992. At the same time, recycling fever spread across the country. And soon, recycling sewage sludge caught on. Sewage had been used this way on a smaller scale for many years, but the popularity of recycling it magnified an argument that has long raged over its potential benefits and concerns over safety.⁷

One of the first changes to occur as sewage sludge recycling became more popular was one of nomenclature. What was formally referred to as sewage sludge was now labeled as "biosolids." The actual term "biosolids" was created in 1991 by the "Name Change Task Force" at the Water Environment Federation (WEF), which is the water and wastewater industry's main trade and lobby organization in the USA, and it is now in common use throughout the world.⁸ The stated purpose for the name change was to make the land application of processed sewage sludge more acceptable to the U.S. public.⁹

Technically speaking, "biosolids" are the nutrient rich solid material that is produced during the treatment of domestic wastewater at a treatment facility. Solid materials are removed from sewage during the wastewater treatment process. During treatment, bacteria and other microorganisms break components in the wastewater down into simpler and more stable forms of organic matter. Non-organic matter also settles into sludge. For instance, heavy metals and other toxic materials, including flame retardants and persistent organic pollutants, are commonly found in sewage sludge. What does not settle into sludge leaves the treatment facility as a treated wastewater effluent.¹⁰

⁶ See Domestic Septage Regulatory Guidance, A Guide to the EPA 503 Rule, EPA, Office of Water Regulations and Standards, 832-B-92-005 (Sept. 1993).

⁷ See generally Grossi, *supra* note 4, at A1.

⁸ See Biosolids, SourceWatch, at <<http://www.sourcewatch.org/index.php?title=Biosolids>> (last visited May 17, 2006).

⁹ See Biosolids, Water Environment Federation, at <<http://www.wef.org/ScienceTechnologyResources/Biosolids/index.htm>> (last visited May 17, 2006).

¹⁰ See generally A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA, EPA 1832-R-93-003 (1994).

According to the Environmental Protection Agency (EPA), biosolids that meet treatment and pollutant content criteria “can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth.”¹¹ This EPA policy on sewage sludge recycling is highly controversial. Although often thought to consist of only “human waste,” sewage sludge in fact contains all materials from cities which the treatment can remove from wastewater.¹² This variety of sources can be quite staggering, including the following:

- Human waste, usually from lavatories: feces, used toilet paper, wipes, urine, other bodily fluids) also known as black water
- Cesspit leakage
- Septic tank discharge
- Sewage treatment plant discharge
- Washing water (personal, clothes, floors, dishes, etc.) also known as greywater or sullage
- Rainfall collected on roofs, yards, hard-standings, etc. (traces of oils and fuel but generally clean)
- Ground water infiltrated into sewage pipes

¹¹Standards for the Use or Disposal of Sewage Sludge, 40 C.F.R. § 503 (1993).

¹²See, e.g., Docket No. 2004N-0258, Produce Safety from Production to Consumption: An Action Plan to Minimize Foodborne Illness Associated with Fresh Produce, Safe Tables Our Priority, *available at* <<http://www.fda.gov/ohrms/dockets/dailys/04/july04/072904/04N-0258-emc00003-01.pdf>> (last visited May 17, 2006).

- Surplus manufactured liquids from domestic sources (drinks, cooking oil, pesticides, lubricating oil, paint, cleaning liquids, etc.)
- Urban rainfall run-off from roads, car-parks, roofs, side-walks or pavements (contains oils, animal feces, litter, fuel residues, rubber residues, metals from vehicle exhausts, etc.)
- Sea water ingress
- Direct ingress of river water
- Direct ingress of man-made liquids (illegal disposal of pesticides, used oils, etc.)
- Highway drainage
- Storm drains
- Black water - surface water contaminated by sewage
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Industrial waste

- Industrial site drainage



Industrial cooling waters

- ♣ Industrial process waters

- ♣ Organic - bio-degradable - includes waste from abattoirs and creameries and ice-cream manufacture

♣ Organic - non bio-degradable or difficult to treat - for example pharmaceutical or pesticide manufacturing

♣ Inorganic - for example from the metalworking industry

♣ Extreme pH - from acid/alkali manufacturing, metal plating

♣ Toxic - e.g. from metal plating, cyanide production, pesticide manufacturing

♣ Solids and Emulsions - e.g. Paper manufacturing, food stuffs, lubricating and hydraulic oil manufacture

♣ Agricultural drainage - direct and diffuse¹³

As would be expected with such a diverse concoction, the composition of biosolids can also vary widely, and may contain any or all of the following:

-

Water (>95%) (often added during flushing to carry the waste down a drain)

- Non-pathogenic bacteria (>100,000/ml for sewage)
- Pathogens (bacteria, viruses, prions, parasitic worms)

¹³See Wastewater, Wikipedia, at <<http://en.wikipedia.org/wiki/Wastewater>> (last visited May 17, 2006); *see also* MILTON R. BEYCHOK, AQUEOUS WASTES FROM PETROLEUM AND PETROCHEMICAL PLANTS (1st ed. 1967); G. TCHOBANOGLOUS ET AL., WASTEWATER ENGINEERING (TREATMENT DISPOSAL REUSE) (4th ed. 2003).

- Organic particles (feces, hairs, food, vomit, paper fibres, plant material, humus, etc.)
- Soluble organic material (urea, fruit sugars, soluble proteins, drugs, pharmaceuticals, etc.)
- Inorganic particles (sand, grit, metal particles, ceramics, etc.)
- Soluble inorganic material (ammonia, road-salt, sea-salt, cyanide, hydrogen sulphide, thiocyanates, thiosulphates)
- Animals (protozoa, insects, arthropods, small fish, etc.)
- Macro-solids (sanitary towels, nappies/diapers, condoms, needles, children's toys, dead pets, body parts, etc.)
- Gases (hydrogen sulphide, carbon dioxide, methane)
- Emulsions (oils in emulsion, paints, adhesives, mayonnaise, hair colourants, etc.)
- Toxins (pesticides, poisons, herbicides)¹⁴

Despite the concerns over its use, on July 18, 1991, the EPA published a notice in the Federal Register outlining the U.S. policy statements on the beneficial use of biosolids on Federal land, including its use on food crops.¹⁵ Included were requirements for the use of biosolids as set out in Title 40 of the Code of Federal Regulations, part 503.¹⁶ Part 503 requires either elimination of pathogens or significant reduction of pathogens along with certain restrictions

¹⁴*Id.*

¹⁵Interagency Policy on Beneficial Use of Municipal Sewage Sludge on Federal Land, 56 Fed. Reg. 33,186 (July 18, 1991).

¹⁶Standards for the Use or Disposal of Sewage Sludge, *supra* note 11.

(such as minimum times between the application of biosolids and the harvest of different food or feed crops).¹⁷ Some states also have requirements for the use of biosolids, and where applicable, growers using biosolids must first meet the requirements of Part 503 and then comply with any additional state requirements.¹⁸

The current regulations found in Part 503 are “derived from regression analysis studies of compost research and thermal inactivation analysis in model matrices.”¹⁹ The goal of this regulation is predominantly an issue of uniformity and consistency of process controls.²⁰ One of the products of Part 503 is to create two different classes of potential sludge certification, depending on the relative safety of the sludge.²¹ Class A sewage sludge is considered the safest, and can be used without restrictions as fertilizer. In order to qualify as Class A biosolids, the temperature of the sewage sludge must be maintained at a specific value for a minimum period of time, depending on the percent of solids and the treatment method (usually 131–140 degrees F or greater for from 4 hours to up to 15 days).²²

If sewage sludge does not meet the Class A certification, then it may still qualify as Class B sludge.²³ Class B sewage sludge is allowed up to twice as many pathogens per kilogram as Class A sludge.²⁴ Due to its potentially increased levels of pathogens, this material could

¹⁷ *Id.*

¹⁸ Guidance for Industry – Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, FDA/Center for Food Safety and Applied Nutrition (CFSAN), Oct. 26, 1998, *available at* <<http://www.cfsan.fda.gov/~dms/prodguid.html>> (last visited May 17, 2006).

¹⁹ Analysis and Evaluation of Preventive Control Measures for the Control and Reduction/Elimination of Microbial Hazards on Fresh and Fresh-Cut Produce: Chapter 2: Production Practices as Risk Factors in Microbial Food Safety of Fresh and Fresh-Cut Produce, FDA/Center for Food Safety and Applied Nutrition (CFSAN), Sept. 30, 2001, *available at* <<http://www.cfsan.fda.gov/~comm/ift3-toc.html>> (last visited May 17, 2006); *see also*, Muhherjee, “Preharvest Evaluation of Coliforms, *Escherichia coli*, *Salmonella* and *Escherichia coli* O157:H7 in Organic and Conventional Produce Grown by Minnesota Farmers,” 67 J. OF FOOD PROTECTION 898 (2004).

²⁰ *See* Composting Council Research and Education Foundation, at <<http://tmecc.org/tmecc/index.html>> (last visited May 17, 2006).

²¹ *See* Standards for the Use or Disposal of Sewage Sludge, *supra* note 11.

²² *See id.* at § 32(a).

²³ *Id.* at § 32(b).

²⁴ *Id.*

not be used or sold for use on vegetable crops or distributed to the general public without management requirements and site restrictions.²⁵ Class B product can be used on crops that will be consumed by humans or animals; however, there are requirements for waiting periods between the time of application and crop harvest and for restricting public access.²⁶ The amount of waiting time required depends on various factors (for example proximity of edible part of the plant to the soil), details of which are readily available in the Part 503 rule.²⁷ States may have more restrictive and independent rules for biosolids use and reporting.²⁸ As a precaution, produce buyers often use market pressure to preclude growers from producing fruits and vegetables on ground with a prior history of biosolid application.²⁹

Despite these initial attempts by Congress and the EPA to secure Americans from food borne illness, the detection of pathogen outbreaks associated with both domestic and imported fresh fruits and vegetables has continued to increase over the last several years.³⁰ In response, in a January 1997 radio address, President Clinton announced a Food Safety Initiative to improve the safety of the nation's food supply.³¹ In May of 1997, as part of the President's Food Safety Initiative, the Department of Health and Human Services, the U.S. Department of Agriculture (USDA), and the EPA sent to the President a report that identified produce as an area of concern.³²

On October 2, 1997, President Clinton announced a plan entitled "Initiative to Ensure the Safety of Imported and Domestic Fruits and Vegetables" to provide further assurance that fruits

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

²⁸ See Analysis and Evaluation, *supra* note 19, at Appendix A, for a summary of specific requirements from a collection of states.

²⁹ See, e.g., Grossi, *supra* note 4, at A1.

³⁰ Cooperative Agreement To Support the Waste-Management Education and Research Consortium, New Mexico State University; Notice of Intent to Accept and Consider a Single Source Application, 65 Fed. Reg. 45,083 (July 20, 2000) ("Imports have doubled over the past 7 years and they are expected to increase by 30 percent by 2002.").

³¹ Radio Address of the President to the Nation., The White House, Office of the Press Secretary (Jan. 25, 1997).

³² Food Safety from Farm to Table: A National Food-Safety Initiative – A Report to the President, EPA/HHS/USDA (May 1997).

and vegetables consumed by Americans, whether grown domestically or imported from other countries, meet the highest health and safety standards.³³ As part of this initiative, the President directed the Secretary of Health and Human Services, in partnership with the Secretary of Agriculture and in close cooperation with the agricultural community, to issue guidance on good agricultural practices (GAPs) and good manufacturing practices (GMPs) for fruits and vegetables.³⁴ In response to this directive, the FDA and USDA issued a report entitled ‘‘Guidance for Industry –Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables.’’³⁵ This guidance document addresses microbial food safety hazards and good agricultural and management practices common to the growing, harvesting, washing, sorting, packing, and transporting of most fruits and vegetables sold to consumers in a raw form. It was intended to be a voluntary, science-based guidance that could be used by both domestic and foreign fresh fruit and vegetable producers to help ensure the safety of their produce.³⁶ It should be emphasized that this produce guide is nothing more than mere voluntary guidance; yet, other than the ban on dumping in oceans, and the certification process through the EPA, these guidelines constitute virtually all federal government oversight over the use of biosolids on food crops. It is not a regulation, and does not have the force and effect of law and is thus not subject to enforcement.³⁷ The FDA and USDA suggest that the voluntary nature of the guidance is consistent with U.S. trade rights and obligations and will not impose unnecessary or unequal restrictions or barriers on either domestic or foreign producers.³⁸ Nevertheless, for many critics, the unenforceable nature of the guidelines means that they do little if anything

³³Memorandum for the Secretary of Health and Human Services, The Secretary of Agriculture, The White House (Oct. 2, 1997).

³⁴*Id.*

³⁵*See* Guidance for Industry, *supra* note 18.

³⁶*Id.*

³⁷*Id.*

³⁸*Id.*

to ensure the safety of America's produce.

Moreover, the guidelines themselves are vague even in its own terms. For instance, the guide points out that "[t]here are a number of gaps in the science upon which to base a microbial testing program," and thus any specific recommendations that could be offered by the guide would be "of limited usefulness."³⁹ Moreover, the guide notes that "[a]lthough no one knows for sure how long pathogens can survive in the field or on produce, some researchers have reported that, depending on conditions, pathogens may survive in raw manure for as much as a year or longer."⁴⁰ Furthermore, in a companion set of guidelines produced in 2001, the FDA noted that "[a] high degree of uncertainty remains about the efficacy of the treatment and usefulness of indicators as presumptive evidence of the absence of pathogens,... additional research on persistence in soil and on plant surfaces is needed to support science-based policy decisions on restrictive limits,... [s]pecific distance limits that would ensure the safety of the produce have not been scientifically validated,... [and t]o the best of our knowledge, [none] of these [time] recommendations has been evaluated, and currently there is no scientifically based determination of a safe temporal separation between aged manure incorporation and planting."⁴¹ In light of these uncertainties, the guide largely simply defers to "good agricultural practices" to ensure quality produce care and management.⁴²

The actual content of the guidelines is divided into eight principles, which may be briefly summarized:

Principle 1. Prevention of microbial contamination of fresh produce is favored over reliance

³⁹*Id.*

⁴⁰*Id.*; see also W. Wang et al., *Fate of enterohemorrhagic Escherichia coli 0157:H7 in bovine feces*, 62 J. OF APPLIED & ENVTL. MICROBIOLOGY No. 7 (1996).

⁴¹Analysis and Evaluation, *supra* note 19.

⁴²See generally Guidance for Industry, *supra* note 18.

on corrective actions once contamination has occurred.⁴³

Principle 2. To minimize microbial food safety hazards in fresh produce, growers, packers, or shippers should use good agricultural and management practices in those areas over which they have control.⁴⁴

Principle 3. Fresh produce can become microbiologically contaminated at any point along the farm-to-table food chain. The major source of microbial contamination with fresh produce is associated with human or animal feces.⁴⁵

Principle 4. Whenever water comes in contact with produce, its source and quality dictates the potential for contamination. Minimize the potential of microbial contamination from water used with fresh fruits and vegetables.⁴⁶

Principle 5. Practices using animal manure or municipal biosolid wastes should be managed closely to minimize the potential for microbial contamination of fresh produce.⁴⁷

Principle 6. Worker hygiene and sanitation practices during production, harvesting, sorting, packing, and transport play a critical role in minimizing the potential for microbial contamination of fresh produce. Special care must be given to ensure that people with infectious diseases, especially those accompanied by diarrhea or open lesions, do not have direct contact with produce. Disposable gloves should be used, and proper hand-washing techniques practiced.⁴⁸

Principle 7. Follow all applicable local, state, and Federal laws and regulations, or corresponding or similar laws, regulations, or standards for operators outside the U.S., for agricultural

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.* Proper handwashing techniques are defined to include the following:

- Handwashing with water. Warm water is more effective than cold water for washing hands;
- Use of soap; and
- Thorough scrubbing (including cleaning under fingernails and between fingers), rinsing, and drying of the hands. Common, or shared, towels should be not be used.

practices.⁴⁹

Principle 8. Accountability at all levels of the agricultural environment (farm, packing facility, distribution center, and transport operation) is important to a successful food safety program. There must be qualified personnel and effective monitoring to ensure that all elements of the program function correctly and to help track produce back through the distribution channels to the producer.⁵⁰

To focus specifically on the subject of biosolids waste management, I wish to point out that while the guidelines recommend close management of its use, it does not offer how such supervision is to occur, nor does it provide any means to ensure that supervision is realized.⁵¹ However, the guide does offer a few practical suggestions, such as to maximize the time between application of biosolids to production areas and harvest of the crops, to erect barriers to secure biosolids storage, and to establish field plans where the fields closest to fresh produce crops are planted with crops that do not receive manure.⁵² In addition, in order to avoid worker-originated fecal contamination, the guide recommends readily-accessible and well-supplied toilet facilities.⁵³

The guide introduces its recommendations by noting that “[w]hereas the health benefits associated with regular consumption of fresh fruits and vegetables have been clearly demonstrated, an increasing – though still small – proportion of reported outbreaks of food borne illness are

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ However, there is much attention given in the guide on the proper use of unpolluted water, especially when water is to be in direct contact with the edible portion of the produce, with special recommendations for care when using water which may be polluted by runoff from upstream livestock operations.

⁵² See Guidance for Industry, *supra* note 18; Working Draft – Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables, FDA/Center for Food Safety and Applied Nutrition (CFSAN), Nov. 25, 1997, *available at* <<http://www.cfsan.fda.gov/~dms/proddrft.html>> (last visited May 17, 2006). See also Analysis and Evaluation, *supra* note 19 (emphasizing the role proximity plays in increasing the chance of contamination).

⁵³ See Working Draft, *supra* note 52 (“The more accessible the facilities, the greater the likelihood that they will be used. Workers should always have the opportunity to use the facilities when they need to, not only when they are on break. This helps reduce the incidence of workers in the field or outside packing areas relieving themselves elsewhere (such as in fields).”).

traced to fresh produce.⁵⁴ Recent outbreaks of food borne illness associated with produce, including *E. coli* in mesclun mix lettuce and *Cyclospora* in imported raspberries, have raised concerns regarding the potential safety of fruits and vegetables that are not subsequently processed to reduce or eliminate pathogens.⁵⁵ Despite this cautionary note, the guide then emphasizes that no reliable estimates are currently available on the actual incidence and prevalence of food borne infection associated with the consumption of fresh produce.⁵⁶

Although the actual incidence of food contamination is unknown, there are a number of known outbreaks which have been traced to preventable contact with fecal matter. For instance, research has shown that the use of contaminated irrigation water can increase the frequency of pathogen isolation from harvested produce.⁵⁷ Also, in 1990 and 1993, two outbreaks, involving at least 300 cases in four states attributed to *Salmonella* species, were linked to consumption of fresh tomatoes.⁵⁸ Tomatoes from both outbreaks were traced back to a single packing facility where it is believed that contaminated tomatoes were able to spread the pathogens through communal use of a tomato water-bath. Moreover, surface water used to irrigate leaf lettuce was identified as the possible cause of a 1995 outbreak of *E. coli* in Montana that sickened at least 29 people.⁵⁹

In June 2004, the FDA reported illness outbreaks related to *Salmonella Bovismorbificans* in

⁵⁴See G. Zepp et al., *Food Safety and fresh fruits and vegetables: is there a difference between imported and domestically produced products?*, Vegetables and Specialties, Situation and Outlook Report, USDA, VGS-274:23-28 (April 1998).

⁵⁵Guidance for Industry, *supra* note 18.

⁵⁶*See id.*

⁵⁷See N.N. Norman & P.W. Kabler, *Bacteriological Study of Irrigated Vegetables*, 25 SEWAGE AND INDUSTRIAL WASTES 605-609 (1953); S.G. Dunlop & W.L.L. Wang, *Studies on the Use of Sewage Effluent for Irrigation of Truck Crops*, 24 JOURNAL OF MILK FOOD TECHNOLOGY 44-47 (1961).

⁵⁸R.C. Wood et al., Abstract: A multistate outbreak of *Salmonella javiana* associated with raw tomatoes, Epidemic Intelligence Service 40th Ann. Conference, CDC (Atlanta, GA 1991).

⁵⁹Karen Egbert, Center for Science in the Public Interest, Re: Comments on Proposed Produce Safety Action Plan, Docket No. 2004N-0258 (July 21, 2004), at 6, available at <<http://www.fda.gov/ohrms/dockets/dailys/04/july04/072904/04N-0258-emc00002-01.pdf>> (last visited May 17, 2006).

raw alfalfa sprouts and *Cyclospora* in raw basil and mesclun/spring mix salad.⁶⁰ The alfalfa outbreak, which caused 12 cases in Oregon and Washington state, was particularly troubling since it was caused by a form of *Salmonella* rarely seen in the United States but capable of causing serious and sometimes fatal infections in young children, the elderly and those with weakened immune systems. Contamination of romaine lettuce with *E. coli* has been blamed for three foodborne illness outbreaks reported between July 2002 and October 2003.⁶¹

Other FDA studies have shown that samples of fresh produce, such as scallions and cantaloupes, regularly test positive for human pathogens;⁶² that pathogens can be internalized in certain fruits and vegetables, particularly during post-harvest handling;⁶³ and that surface treatments, such as washing, have limited effectiveness in reducing microbial populations.⁶⁴

According to a report by the nonprofit Center for Science in the Public Interest (CSPI) vegetables and fruits triggered 31 known outbreaks from 2002 to 2003, compared with only 29 for chicken and other poultry.⁶⁵ Overall, contaminated tomatoes, sprouts and other produce made 28,315 people sick during 554 outbreaks from 1990 to 2003.⁶⁶ In fact, more cases are attributed to produce than any other type of food.⁶⁷ This signals that FDA's current approach -- based on a program of voluntary compliance with guidelines, education, and awareness -- is not effective

⁶⁰ Sprouters Northwest, Inc. Recalls Raw Alfalfa Sprouts Due to Possible Health Risk, FDA, FDA Statement (June 3, 2004), at <<http://www.fda.gov/bbs/topics/news/2004/NEW01075.html>>; FDA Issues Alert on Foodborne Illness Associated with Certain Basil and Mesclun/Spring Mix Salad Products, FDA News (May 21, 2004), at <<http://www.fda.gov/bbs/topics/news/2004/NEW01071.html>>.

⁶¹ See Dania Akkad, *Local produce linked to E. coli outbreaks*, THE SALINAS CALIFORNIAN, May 29, 2004, available at <<http://www.californianonline.com/news/storeis/20040529/localnews/532178.html>> (last visited May 17, 2006). See also FDA Issues Nationwide Alert to Consumers About Spokane Brand Romaine Lettuce Due to Possible Health Risk, FDA, FDA News (July 29, 2002).

⁶² See, e.g., FDA Survey of Domestic Fresh Product, FY 2000/2001 Field Assignment, FDA, CFSAN (Jan. 2003), at <<http://vm.cfsan.fda.gov/~dms/prodsu10.html>> (last visited May 17, 2006); FDA Survey of Imported Fresh Produce, FY 1999 Field Assignment, FDA (Jan. 30, 2001), at <<http://www.vm.cfsan.fda.gov/~dms/prodsur6.html>> (last visited May 17, 2006).

⁶³ Potential for Infiltration, Survival and Growth of Human Pathogens within Fruits and Vegetables, FDA, CFSAN (Nov. 1999), at <<http://vm.cfsan.fda.gov/~comm/juicback.html>> (last visited May 17, 2006).

⁶⁴ Egbert, *supra* note 59, at 2.

⁶⁵ *Vegetables, Fruits Cause More Food Illnesses - Bacteria from manure Fertilizers Contaminating Fresh Produce*, Group Says, REUTERS, Nov. 22, 2005.

⁶⁶ *Id.*

⁶⁷ Egbert, *supra* note 59, at 2.

in preventing foodborne illness from fresh produce.⁶⁸ CSPI officials urge federal regulators to do more to protect the nation's food supply – a job currently divided among at least 10 U.S. agencies, including the Food and Drug Administration and the Department of Agriculture.⁶⁹ Although some of the increased incidence of food-related illness can be attributed to Americans eating more fresh fruits and vegetables over the past two decades,⁷⁰ and although there is currently difficulty in identifying the precise point of contamination, there is certainly a real possibility that illnesses could be reduced through better government supervision. The National Research Council (NRC) published ‘‘Biosolids Applied to Land: Advancing Standards and Practices’’ in July 2002.⁷¹ They concluded that there is no documented scientific evidence that biosolids regulations have failed to protect public health, but there is persistent uncertainty on possible adverse health effects.⁷² The NRC noted that further research is needed and made about 60 recommendations for addressing public health concerns, scientific uncertainties, and data gaps in the science underlying the sewage sludge standards.⁷³ The EPA claims to have had insufficient funding to implement NRC recommendations as of 2004, even though at the same time it has funneled millions of dollars to the Water Environment Federation to promote the land application of sewage sludge. To take a closer look at the actual biosolids product, in its liquid form it looks like muddy water and contain 1-10% solids. However, before being used for land application, biosolids are dewatered to a state of 11-40% solids, which turns it into a ‘‘cake’’ with the texture of a wet sponge. Over 64 million tons of human waste is generated each year, which translates

⁶⁸ See, e.g., Egbert, *supra* note 59.

⁶⁹ See *Vegetables*, *supra* note 65.

⁷⁰ See Guidance for Industry, *supra* note 18.

⁷¹ A pre-publication copy of this book is available at <<http://www.epa.gov/waterscience/biosolids/nas/complete.pdf>>.

⁷² *Id.*

⁷³ *Id.*

into about 5.6 million dry tons of biosolids after treatment.⁷⁴

In the United States as of 2002, about 60% of all biosolids is ‘‘beneficially applied’’ to land as fertilizer for growing crops. Rates and frequency of biosolids application to farmland vary, but typically range from 4 to 6 tons/acre, while small-scale intensive, vegetable operations may apply as much as 12 to 14 tons/acre.⁷⁵ As mentioned earlier, biosolids that meet the Class B treatment and pollutant criteria can be land applied with formal site permit restrictions and strict record keeping, while Class A biosolids may be used with even fewer restrictions. Sewage treatment plants may pursue a number of options in order to sterilize the sludge.⁷⁶ Passive treatments rely primarily on the passage of time, in conjunction with environmental factors, such as natural temperature and moisture fluctuations and ultraviolet (UV) irradiation, to reduce pathogens. To minimize microbial hazards, growers relying on passive treatments should ensure manure is well aged and decomposed before applying to fields. Holding time for passive treatments will vary depending on regional and seasonal climatic factors and on the type and source of manure. Passive treatments such as aging should not be confused with actively managed treatments such as composting.⁷⁷

Active treatments generally involve a greater level of intentional management and a greater input of resources compared with passive treatments. Active treatments include pasteurization, heat drying, anaerobic digestion, alkali stabilization, aerobic digestion, or combinations of these.⁷⁸

Composting is an active treatment commonly used to reduce the microbial hazards of raw manure.

⁷⁴See Analysis and Evaluation, *supra* note 19.

⁷⁵*Id.*

⁷⁶However, it is important to keep in mind that these processes to reduce pathogens have no effect on heavy metals and other pollutants in sewage sludge.

⁷⁷See Guidance for Industry, *supra* note 18.

⁷⁸*Id.*

It is a controlled and managed process in which organic materials are digested, aerobically or anaerobically, by microbial action. When composting is carefully controlled and managed, and the appropriate conditions are achieved, the high temperature generated can kill most pathogens in a number of days. Thus, the risk of microbial contamination from composted manure is reduced compared to untreated manure.⁷⁹ Consequently, Class B biosolids can often be upgraded to Class A status after undergoing the process of composting.

The effectiveness of an antimicrobial agent depends on its chemical and physical state, treatment conditions (such as water temperature, acidity [pH], and contact time), resistance of pathogens, and the nature of the fruit or vegetable surface. Chlorine, for example, is commonly added to water at 50-200 ppm, at a pH of 6.0-7.5, for post-harvest treatments of fresh produce, with a contact time of 1-2 minutes.⁸⁰

Ozone has been used to sanitize wash and flume water in packinghouse operations. Ultraviolet radiation may also be used to disinfect processing water. Chlorine dioxide, trisodium phosphate, and organic acids (such as lactic and acetic acids) have been studied for use as antimicrobial agents in produce wash water, although more research needs to be done. Operators are encouraged to consider options for water sanitation most appropriate for their individual operations.⁸¹

Treatment of produce with ionizing radiation at doses up to 1 kGy (1 kiloGray or 100 krad) is permitted for inhibition of ripening or sprouting, and for insect control. At these doses, there would also be some reduction in pathogens that may be present. The extent of any reduction will be dependent on the radiation sensitivity of the particular pathogen as well as the actual dose used. For example, doses needed to achieve a 10-fold reduction in *Salmonella* are typically higher than those needed to achieve the same reduction in *E. coli*. The actual effectiveness

⁷⁹*Id.*; see also R.T. HAUG, THE PRACTICAL HANDBOOK OF COMPOST ENGINEERING (Tachnomics Pub. Co. 1993).

⁸⁰S. REINERS ET AL., PREVENTION OF FOODBORNE ILLNESS BEGINS ON THE FARM (Cornell Coop. Ext. 2005).

⁸¹See Guidance for Industry, *supra* note 18.

of any low-dose radiation treatment in pathogen control will, in addition, be strongly dependent on the load initially present.⁸²

The most common treatment for produce -- washing -- can reduce the overall potential for microbial food safety hazards. This is an important step since most microbial contamination is on the surface of fruits and vegetables. If pathogens are not removed, inactivated, or otherwise controlled, they can spread to surrounding produce, potentially contaminating a greater proportion of the produce.⁸³

A number of post-harvest processes, such as hydrocooling, use of dump tanks, and flume transport, involve a high degree of water-to-produce contact.⁸⁴ Packers should follow good manufacturing practices to maximize the potential for these processes to assist in cleaning produce.⁸⁵ For instance, for some types of produce (apples, celery, tomatoes) the temperature of wash water should be greater than that of the produce or a pressure differential results that can cause water to be pulled into the plant material, causing pathogens that may be present on the produce surface or in the water to be internalized.⁸⁶ If pathogens are pulled into the produce, washing is unlikely to reduce these pathogens. Denser products (such as carrots) do not appear to be affected by water temperature differences.⁸⁷

Moreover, handling will likely be different for crops with highly textured surfaces (e.g., leafy crops and cantaloupes) compared to crops with smooth surfaces or for orchard crops compared

⁸²See J.B. Farrell, *Reduction in bacterial densities of wastewater solids by three secondary treatment processes*, 62 RESEARCH JOURNAL OF THE WATER POLLUTION CONTROL FEDERATION 177-84 (1990). See also 21 C.F.R. 179.26.

⁸³*Id.*

⁸⁴Guidance for Industry, *supra* note 18.

⁸⁵*Id.* For instance, it is recommended that brush washing is more effective than other types of washing at removing pathogens, but that spray wash treatments may be less likely to directly spread microbial contaminants. Also, antimicrobial washes have been shown to reduce microbial populations by 10- to 100-fold.

⁸⁶*Id.* For instance, findings that *Salmonella* in a water bath may be rapidly internalized by tomatoes when the water bath temperature is colder than the tomatoes have led to the recommendation that wash water for tomatoes be hyperchlorinated and 10 degrees F warmer than the tomatoes (Ref X). FDA - pre

⁸⁷R.Y. Zhuang, *Fate of Salmonella montevideo on and in raw tomatoes as affected by temperature and treatment with chlorine*, 61 APPLIED ENVIRONMENTAL MICROBIOLOGY 2127-2131 (1995).

to low growing fruits and vegetables. Berry fruits, such as strawberries and raspberries, are delicate and must be handled very carefully. They are not washed after harvest. Thus, wash water quality is not a major source of contamination for these fruits. In contrast, tomatoes picked in the ‘‘green’’ stage are much sturdier and may be packed into large field totes, flushed from these containers with water, and flumed into the packing house. Because of the high degree of water-to-produce contact, tomato growers and operators should assign a high priority to wash water quality.⁸⁸

Indeed, some studies have even shown that once *E. coli* forms a biofilm on the exterior of produce, it is protected to withstand rinsing and washing.⁸⁹ For example, one study has shown that while pathogenic organisms on lettuce can be reduced by washing, they are not eliminated.⁹⁰ In another study conducted by USDA, it was found that the only effective way to remove *E. coli* from the exterior of contaminated apples was with both heat and chlorine, not just one or the other. Indeed, the summary concludes: ‘‘*E. coli*... cannot be rinsed off with water.’’⁹¹

A Closer Look at the Story of One Sludge Farmer

To get a better feel for this world of sludge farming, and the huge amounts of politicking involved, let us turn to the widely followed experience of California farmer Ceil Howe.⁹²

⁸⁸See generally Working Draft, *supra* note 52.

⁸⁹See Safe Tables Our Priority, *supra* note 12.

⁹⁰Jacqueline Stenson, *Scientists Urge Consumers to Wash Lettuce Carefully*, MEDICAL TRIBUNE NEWS SERVICE, Oct. 2, 1997.

⁹¹Gerald Saper, Research on Decontamination of Apples by Washing with Detergents and Sanitizing Agents, Apple Cider Food Safety Control Workshop (July 15-16, 1999), at <<http://vm.cfsan.fda.gov/~comm/cidwsape.html>> (last visited May 17, 2006).

⁹²The experience of Ceil Howe has been widely reported in newspapers throughout California’s Central San Joaquin Valley. Among the news articles cited below include: Harry Cline, *It’s a matter of survival for Westlake Farms*, WESTERN FARM PRESS, July 5, 2001; *Compost/Sewer Sludge Picture Muddies*, VALLEY VOICE NEWSPAPER, Apr. 20, 2005; James C. Loughrie, *County Sued Over Human Waste Composting*, HANFORD SENTINEL, May 28, 2004; Nick Guroff, *How L.A. Sewage Ends Up in Central*

Ceil Howe was born at his family's 40,000 acre ranch in 1944, has spent most of his life there and has been a leader in Kings County agriculture. His son is the fourth generation of Howes at Westlake. Howe's grandfather farmed the dried western edge of the Tulare Lake bed since 1929, growing wheat and grain on a half section, or 320 acres. In the 1940s, with federal subsidy programs for many crops catching on, cotton became the crop of choice for the Howes and other lake-bottom growers. Cotton would grow well enough on the clay soil, and federal payments for growing it made the crop attractive. Over several decades, the Howes became known for cotton, growing and ginning as well as acquiring land whenever possible. The farm grew to more than 50,000 acres in the late 1960s.⁹³

In this land of giants, the Howes' biggest neighbor to the east, J.G. Boswell, had more than twice the acreage. However, the Howes distinguished themselves as the environmentally-friendly farmers by voluntarily providing more than 700 acres of marshes for stilts, avocets and other shorebirds. The marshes gave birds a healthy alternative to Westlake's tainted irrigation drainage ponds.⁹⁴

Although successful for decades as cotton farmers, the Howes constantly struggled to deal with their thick, cracked clay -- describe by Howe as being like concrete -- which does not grow as much cotton as soil on other west-side farms in the Valley. Then cotton prices retreated in the 1990s, and the Howes could not increase their production per acre to sell enough to make ends meet. In addition, the costs of fuel, equipment and labor climbed, making life tougher on most cotton growers. Many began to let land lie fallow. "It was a tremendous downturn," says Earl Williams, president of the California Cotton Ginners and Growers Association. "We had more than 1 million acres in cotton production at one point in the early 1990s. We now

Valley Farmland, EL TECOLOTE, Dec. 15, 2005; Grossi, *supra* note 4, at A1.

⁹³See Cline, *supra* note 92; Grossi, *supra* note 4.

⁹⁴Grossi, *supra* note 4.

have about 700,000 or 800,000 acres in production.’’⁹⁵

After a disappointing harvest season in 2001, Howe stunned the farming community by shutting down his remaining cotton-growing acreage, about 15,000 acres. He laid off more than 60 permanent employees, and an additional 150 seasonal workers. He mothballed his 800-bale-per-day gin, considered a medium-size operation.⁹⁶ ‘‘Agriculture was getting hammered,’’ Howe says. ‘‘But we weren’t going out of business.’’⁹⁷ While Westlake Farms continued to grow wheat, alfalfa, and other crops, with so many acres of farmland sitting idle, Howe began to look for other options.

This search eventually brought him to talks with the Sanitation Districts of Los Angeles County, which was looking for some way to dispose of the tons of sludge produced there every day. The Howes knew two other farmers, Pat McCarthy and Shaen Magan, had been applying the less-treated Class B sludge to their land as fertilizer, and who had made millions of dollars in the process. McCarthy had fertilized with Class B sludge since the mid-1990s, using it on almost 40% of his 25,000-acre farm. His supply came from Fresno, Avenal, Exeter and other Valley cities as well as Southern California municipalities. The Howes figured they would use the nutrient-rich sludge to invigorate their soil and generate income.⁹⁸

The sludge recycling phenomenon had been going on for years in Kings County. But just months after Howe laid off his permanent employees in his cotton operation, Kings County banned the use of Class B sludge. The ban forced McCarthy and others to stop spreading Class B sludge

⁹⁵ *Id.*

⁹⁶ Guroff, *supra* note 92.

⁹⁷ Grossi, *supra* note 4.

⁹⁸ *See id.*

in January 2003. However, Howe found the county would still allow him to use Class B sludge in a composting operation and spread the composted sludge because it is considered safer.⁹⁹ The proposal, as discussed with the Sanitation Districts of Los Angeles County, was to use treated sewage produced by 5.4 million people and business from 78 different cities to make compost -- lots of it. The project already has cleared what many consider the major hurdle, a county conditional use permit, and sludge might roll up Interstate 5 in the next couple of years. Howe explains that the composting operation not only would help solve L.A.'s sewage treatment problem, but it would also provide an alternative to burning crop waste for farmers. "Every person generates this waste every day," Howe says. "We have a project that would recycle it safely every day. Plus, we give farmers a place to take their crop wastes instead of burning them."'¹⁰⁰

However, for many of the 1,500 people living in the nearest community, Kettleman City, the idea is revolting no matter how well he makes the pitch. Some say it's just a way for Southern California to send the Valley a nasty brew of human and industrial waste. For them, that's just too creepy.¹⁰¹

"How gross can you get?" asks Gloria Racy, 53, who lives in Stratford, 14 miles away. "Of course, I'm opposed to it. We're always a dumping ground in the Valley."'¹⁰²

In Kettleman City, some people call this project environmental racism. Kettleman City is a farmworker community where half the population speaks only Spanish. Residents already live three miles from one of the five largest hazardous waste landfills in the country. The Kettleman opponents say Howe's composted sewage will wind up in fields not far from their back yards.

⁹⁹ *See id.*

¹⁰⁰ *Id.*

¹⁰¹ *Compost/Sewer, supra* note 92.

¹⁰² Grossi, *supra* note 4.

‘‘Agua negra,’’ or black water, is what they call it.¹⁰³

‘‘How come they only think of Kettleman City when there’s something to dump?’’ asks Maricela Mares-Alatorre, 32. ‘‘This sludge is not 100% safe.’’¹⁰⁴

However, Howe is quick to point out that EPA officials have seen numerous studies since the early 1990s, and nothing has convinced them that sludge is dangerous if properly applied and monitored. ‘‘Besides,’’ Howe explains, ‘‘this is not about spreading the actual sludge directly on the ground. The sludge will come to a composter where nature will distill many of the remaining impurities.’’¹⁰⁵

Here’s how it would work: After treatment in a Los Angeles county sewage plant, the damp, chunky and ripe sludge would arrive in 25-ton trucks to a location 4 miles outside of Kettleman City. Crews would combine it with crop waste, such as orchard debris or wood chips, into several piles -- 500 feet long, 7 feet tall and 20 feet wide at the base. A layer of finished compost would cover the piles, keeping bugs away and holding in heat. Inside the piles, natural decomposition and moisture would cause the temperature to rise above 130 degrees over several days, killing off most of the remaining bacteria. To further hold down the smell, workers would mix sludge and farm waste inside a building before moving it to the piles. Also, in deference to the nearby city, the location was chosen such that the prevailing wind in the area blows away from Kettleman.¹⁰⁶

The resulting soil nutrient would have enough nitrogen, phosphorus and potassium to qualify as fertilizer, and it would be deemed sufficiently nutrient safe by the federal government to use in your back yard. In fact, similar compost is commonly sold in the garden department

¹⁰³ *Id.*

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

at home improvement stores under such names as Gromulch.¹⁰⁷

Howe isn't planning to build the composter himself. The Sanitation Districts of Los Angeles, the 78-city confederation, will buy Howe's property and build the \$50 million, state-of-the-art composting operation themselves. Under this arrangement, Westlake Farms would become one of the state's biggest sludge composters, possibly producing up to 320,000 tons annually.¹⁰⁸ Before escrow can close, Howe needs to obtain four permits—two from the local air district, one from state water authorities and one from the state waste-management agency. If the permits are secured, maybe by the end of the year, the Sanitation Districts of Los Angeles will buy the 14,500 acres and permits for more than \$25 million, build the \$50 million composting operation and lease most of the land back to Howe for farming.¹⁰⁹

As part of the deal, Howe says, he will use the composted sewage on that scrubby land. He says he does not fear compost, which is the same stuff his wife uses around their yard at home. Howe adds that he and his family—including his mother and granddaughter—live on the ranch 11 miles from the future composting site. He wouldn't put his family in harm's way, he says. And, along with the Boswells, the Hansens and the Gilkeys, the Howes have been agricultural stalwarts in Kings County. This is no sellout, he says: 'I don't live in Beverly Hills.'¹¹⁰ But these assurances do not assuage Kettleman City opponents, who went down this road once before in the early 1990s when they stood up to Chemical Waste Management Inc. over the installation of a toxic waste incinerator at the company's nearby hazardous waste landfill.¹¹¹

Kettleman City resident Mary Lou Mares helped lead the town in that fight, which eventually resulted in the company abandoning the proposal in 1993, under the guise that the project would

¹⁰⁷Guroff, *supra* note 92.

¹⁰⁸*Id.*

¹⁰⁹*Id.*

¹¹⁰Grossi, *supra* note 4.

¹¹¹Loughrie, *supra* note 92.

not have penciled out financially. The fight lit up this little community where residents are consumed with long working hours in grape vineyards, pistachio orchards and tomato fields. And for many it was certainly worth the fight.¹¹²

You probably wouldn't call Kettleman a family place if you looked just beyond the town's aging houses and worn streets. It has all the ambience of a jumbo industrial park. Cars and trucks blast past on Highway 41 and Interstate 5, some stopping at the fast-food and gas station lights blazing a few blocks from town. Nearby, the California Aqueduct carries water for 18 million Southern Californians. Oil pipelines snake behind Kettleman. Overhead, buzzing cables atop imposing metal towers transport electricity all over California. And there's that hazardous waste landfill just southwest of town with large trucks coming and going. However, Kettleman City is steeped in the Latino culture and family traditions – weddings, dances, close-knit friendships, Saturday gatherings, Sunday worship. This unity in shared values and relationships was key to the success of their fight against the toxic waste incinerator proposal.¹¹³

So successful was their campaign that it captured the interest of Greenpeace and the California Rural Legal Assistance. Greenpeace organized protests, and the CRLA filed court action. Kettleman suddenly became a cause celebre in the green community and a poster child for communities claiming environmental racism.¹¹⁴

Mares-Alatorre, who has lived in Kettleman since she was 5, and is the daughter of the Mary Lou Mares who led the successful campaign against the incinerator, says she still sees the racism. ‘‘No one is saying this out loud, so I will,’’ she says. ‘‘This is a wealthy white man imposing this project on poor Latino people. That's the definition of environmental racism. Someone needs to represent us.’’ Mares-Alatorre tries. Married to farmworker Miguel Alatorre,

¹¹²*Id.*

¹¹³Grossi, *supra* note 4.

¹¹⁴Loughrie, *supra* note 92.

35, she is one of the few Kettleman residents with a bachelor's degree—in linguistics from California State University, Fresno. With their 9-year-old son, Miguel Jr., the Alatorres live in the home of Maricela's parents, who have moved to Sacramento.¹¹⁵

She coaxed more than 200 Kettleman residents to sign a petition opposing the composting project and appeared before the Kings County Board of Supervisors in a last-ditch appeal this year. However, project support from other neighbors and businesses swayed supervisors, who denied appeals and granted a county permit.

Nevertheless, Mares-Alatorre remains dedicated to the fight. She grew up listening to her activist mother and her father, Ramon, a United Farm Workers field organizer whom growers blackballed from fieldwork for his union activities in the 1980s. But she knows the fight is uphill in Kettleman, where less than 20% of the population graduate from high school. Losing the two-year battle over the county permit wore down the community's resistance, she says. Some residents even see a chance for work in the 100-plus jobs at the proposed composting site. They side with Westlake, signing letters circulated by Howe supporters.¹¹⁶

The scene looked much different in 2002 when more than 50 Kettleman residents signed form letters opposing the project. The Kettleman letters, along with protests from many other residents, appeared in the draft environmental impact report. But the final report in January contained an overwhelming majority of supportive letters, mostly from Howe's neighbors and surrounding businesses. The Kettleman contingent and much of the opposition were eclipsed in the documentation. Howe says people finally understood the project would not apply sludge directly to the ground. Adela Aguilera, 50, of Kettleman City seems to confirm Howe's explanation, though she isn't totally convinced. "It doesn't seem bad, the way they talk about it," she says. "But we

¹¹⁵Grossi, *supra* note 4.

¹¹⁶*Id.*

need to see what really happens.’’¹¹⁷

Mares-Alatorre says the protest momentum simply lost steam. Most residents have little time for government meetings and months of discussion. This is not an incorporated city and there are no elected city leaders. Concerned about the lack of representation, some people just leave town. Even a few leaders from the 1990s fight against Chemical Waste have moved.¹¹⁸

‘‘I could leave here, but I don’t want to,’’ says Mares-Alatorre, whose job as a property manager for the United Farm Workers takes her all over the Valley and out of the state. ‘‘I know someone needs to speak up.’’¹¹⁹

The three appeals of the sludge composter went nowhere with the county. Two of the appellants – both lawyers – have joined forces to sue over the project in Kings County Superior Court.

Lawyer Richard Harriman, representing some surrounding landowners and the Fresno-based Valley Advocates, says the project could interfere with a possible restoration of historic wetlands in the area. He filed the lawsuit with lawyer Caroline Farrell of the Center on Race, Poverty and the Environment in Delano, challenging the environmental impact report. Farrell argues the report misrepresents air pollution reductions. Because farmers could use composting as an alternative to open-field burning, Howe claims credit for reducing air pollution, she says.

‘‘But state law is banning farm burning,’’ she says. ‘‘You can’t take credit in an [Environmental Impact Report] for reductions that the law is already making you do. We need a legal accounting of the impact on air quality.’’¹²⁰ The third appellant, Rosemary Chan, 50, of Laton, says thousands of area residents, including those in Kettleman, want a safe environment and do not believe the project addresses their interests. She has not pursued her appeal any further.¹²¹

¹¹⁷*Id.*

¹¹⁸Loughrie, *supra* note 92.

¹¹⁹Grossi, *supra* note 4.

¹²⁰*Id.*

¹²¹Loughrie, *supra* note 92.

Unlike with the toxic waste campaign, Mares-Alatorre and others say no groups are meeting with Kettleman residents. There is no Greenpeace leading an activist campaign in town this time. ‘‘We’re all alone now,’’ Mares-Alatorre says. ‘‘We don’t want that sludge near our homes. I won’t give up telling people our side.’’¹²² To help bolster the campaign, Mares-Alatorre has called upon Cornell University professor Ellen Harrison, who has conducted research on the risks associated with sludge. Although Howe’s proposal to compost Class B sludge is officially considered to result in the higher Class A quality compost, Harrison says no amount of treatment will eliminate metals, such as mercury or lead, which are toxic to people and animals in high doses and can cause kidney disease, hypertension, liver damage, neural damage, structural change in tissues and reproductive difficulties. These metals are dumped into sewage systems by industry, which now uses more than 50,000 chemicals in processes. Many chemicals wind up in sewage along with bacteria, fungi and heavy metals, leading skeptics to wonder about unpredictable combinations of contaminants. ‘‘No one can assure you that treatment, not even composting, will make sludge completely safe,’’ Harrison says.¹²³

Investigating Class B sludge, Harrison claims to have found 39 incidences in 15 states involving 328 people who said they suffered some kind of reaction from sludge.¹²⁴ Aside from respiratory and stomach problems, people reported nosebleeds, burning eyes and flu-like symptoms, she wrote in a study published in 2002. Nobody knows exactly what caused the problems, she says. But because of them, a group of 70 organizations says all sludge and sludge-based products, even compost, are unsafe. The organizations, including Valley Farm Group and Kern Food Growers Against Sewage Sludge, petitioned the EPA last year for a national ban on spreading sludge of any kind.¹²⁵

¹²²Grossi, *supra* note 4.

¹²³*Id.*

¹²⁴*Id.*

¹²⁵Loughrie, *supra* note 92.

The EPA rejected the petition but promised further study of 15 additional chemicals sometimes found in sludge and sludge-based soil nutrients. That is not nearly enough for sludge opponents such as Harrison, who say no one knows if toxins will accumulate in the ground and contaminate future generations. Opponents of sewage sludge also point to a 2002 National Academies of Science report that says EPA's sludge standards are based on outdated science. The report says science is still uncertain about the effects on human health.¹²⁶

“If it were just human excrement, that would be one thing,” says engineer Laura Orlando, executive director of a Boston-based nonprofit called Resource Institute for Low Entropy Systems. “Unfortunately, there’s a lot more that goes down the drain—like heavy metals and endotoxins. We need to keep this out of the life cycle. Landfill it and come up with strategies to produce less waste.”¹²⁷

On the other side of the argument, industries, the EPA and many academics say studies do not indicate danger with treated sludge if it is handled properly. David Crohn, a professor at the University of California at Riverside with a dozen years of research on the subject, says farmers can contain contaminants. “They must be managed,” he says. “We’ve studied the pathogens and how nutrients can be used safely. It works in agriculture. The management contains contaminants.”¹²⁸ Regarding the possible harmful presence of metals in the sludge, Lauren Fondahl, regional biosolids coordinator for the EPA, explained that “[s]ewage treatment operators set limits for heavy metals coming from industries. They are designed to meet clean water

¹²⁶Grossi, *supra* note 4.

¹²⁷*Id.*

¹²⁸*Id.*

standards. [As a result, t]he metal levels are lower than they ever have been.’’¹²⁹

Back in Kings County, the environmental impact study of the Westlake Farms project shows mercury, arsenic, cadmium, copper, lead and other metals would be far below federal limits. Yet suspicion continues to stalk the project, which is not necessarily a bad thing, says Supervising Engineer Mike Sullivan, representing the sanitation districts.¹³⁰ ‘‘It’s good to have close oversight,’’ Sullivan says. ‘‘A lot of people are unfamiliar with this compost. People in the Valley may be using it in their own garden and don’t know it.’’ Sullivan says he grew up near a Southern California composting plant that used sludge. He says people have used the sludge-based compost for decades with no problem. ‘‘We would use the same material for the same product,’’ he says. ‘‘That plant has been doing it for more than 30 years.’’¹³¹

Some of the loudest sludge critics in the Valley are farmers and county officials, who worry about agriculture’s image. Kevin Williams, Stanislaus County’s director of environmental resources, says growers are wary of any connection between their products and sewage sludge. ‘‘Ag is the No. 1 driver of the economy,’’ he says. ‘‘We don’t want anything at all to impair that industry.’’¹³²

McCarthy still uses Class B sludge from Fresno and other cities in his San Joaquin Composting, located in an isolated western Kern County area called Lost Hills. He mixes the sludge with farm waste, such as prunings. The composter on the Howe property would do the same, taking up to 500,000 tons of Class B sludge and 400,000 tons of crop wastes to combine with sludge for compost.¹³³

The Howes say it would help farmers fight air pollution. A new state air quality law requires

¹²⁹ *Id.*

¹³⁰ *Compost/Sewer, supra* note 92.

¹³¹ Grossi, *supra* note 4.

¹³² *Id.*

¹³³ Cline, *supra* note 92.

farmers to begin phasing out crop waste burning in the next several years. ‘‘The whole Valley is in a crisis over the burning issue,’’ Ceil III says. ‘‘We have an opportunity to help every other farmers reduce field burning.’’,¹³⁴

As for those who still worry about the sludge, officials for the Los Angeles County sanitation districts say they don’t plan to run the composter at full capacity. And other technologies would contain and filter gases coming off the piles.¹³⁵

None of this convinces Rosemary Chan, a Laton resident and West Hills College student who tried unsuccessfully to stop the project. ‘‘There are things that can’t be removed from sewage,’’ she says. ‘‘What if there was a flood in the lake basin? That alone makes me afraid. We’re being taken advantage of.’’,¹³⁶

Engineer Sullivan of the sanitation districts answers: ‘‘This is the best composter you can technically build. It’s a lot more expensive than we thought it would be, but we’re doing it because we want to be good neighbors. We understand some people won’t be convinced. We’re going to try to change their minds over time.’’,¹³⁷

A Broader Look at the Situation in California

As has been highlighted in this paper, federal oversight of biosolids is minimal at best. Rather, if any monitoring is done, it will most likely occur at the county level. In California, for instance, individual counties control the amounts of sludge applied and distances from water supplies.¹³⁸ Merced County is one of the few Central Valley counties in California to continue

¹³⁴ *Id.*

¹³⁵ *Compost/Sewer, supra* note 92.

¹³⁶ Grossi, *supra* note 4.

¹³⁷ *Id.*

¹³⁸ See Kerry Cavanaugh, *Green Acres Ain’t the Place to Be – L.A. Mulls Pro-Sludge Campaign*, L.A. DAILY NEWS, Feb. 19,

allowing direct land spreading of less-treated sludge, the Class B.¹³⁹ However, the county does not allow the sludge any closer than 500 feet from drinking water wells, homes, schools or hospitals. To varying degrees, many other Valley counties, such as Fresno, Tulare, Stanislaus, San Joaquin and Kern, have bans on Class B sludge.¹⁴⁰

And California's Central Valley counties are not the only ones to weigh in the matter, as some Central Valley cities have also been getting into the mix. In November 2005, the Fresno City Council considered a proposal to send the city's biosolids to Kern County for use on farmland.¹⁴¹ The proposal was narrowly defeated 4-3.¹⁴² Advocates against the proposal argued that "[i]t's unfair for the city of Fresno to determine the quality of life down in Kern County."¹⁴³ Under the proposal, the city would have paid their two sewage treatment companies -- Tule Ranch and Magan Ranch -- about \$1.18 million annually to dispose of 47,000 tons of biosolids, which is about half of the output of Fresno's regional wastewater-treatment plant.¹⁴⁴

Several Kern officials, as well as state Sen. Dean Florez, D-Shafter, objected to the proposal, claiming several environmental concerns, including water contamination. Sen. Florez praised the city council's decision: "I actually think they showed some leadership. They showed we're one Valley."¹⁴⁵

Florez had come to the meeting with the goal of persuading the council to postpone any action until June 2006, when Kern voters will consider an initiative to ban applying the sewage sludge

2006.

¹³⁹See references at *supra* note 28.

¹⁴⁰*Id.*

¹⁴¹See John Ellis, *Fresno Biosolids Won't Go to Kern Co. - City Council Rejects Five-Year Contract*, FRESNO BEE, Nov. 30, 2005.

¹⁴²*Id.*

¹⁴³*Id.*

¹⁴⁴See *Compost/Sewer*, *supra* note 92.

¹⁴⁵See Ellis, *supra* note 141.

to the county's lands. The measure is expected to pass overwhelmingly in a region where local politicians complain their community is treated like the toilet of the Southland and Los Angeles sanitation officials are portrayed as 'sludge peddlers.',¹⁴⁶

However, instead of sending the biosolids to Kern County, they will be treated by another company named Earthwise, which will send the biosolids to a Merced County site for composting. Unlike Kern County, nobody from Merced County objected to the proposal.¹⁴⁷ Currently, all of Fresno's biosolids --- about 95,000 tons per year --- are sent to San Joaquin Composting in Kern County, said Patrick Wiemiller, Fresno's interim public-utilities director.¹⁴⁸

Perhaps Kern County has special reason to be especially obsessed with the recent sludge farm trend, as it currently houses many of the largest sludge farms in the state.¹⁴⁹ One such farm, ironically named the Green Acres Farm in reference to a 1960s television show by the same name, receives 750 tons of sludge each day from Los Angeles County 120 miles away at a cost of \$7 million a year.¹⁵⁰ For Kern County residents, it is obvious why they would oppose use of their land as a depository for the region's sewage. 'Why would anybody want crap to come to their town?' said Janet Hawkins, 49, a retired hairdresser from Taft. 'If they don't want it, why would we?,'¹⁵¹

However, should the measure to ban land application of sludge in Kern County pass, then Los Angeles officials would have to spend up to \$21 million more each year to truck the 750 tons of treated sewage a day to another facility in Arizona.¹⁵² 'We're not dumping a big mess on Kern County,' said Nancy Sutley, Mayor Antonio Villaraigosa's deputy mayor for energy and

¹⁴⁶ See Cavanaugh, *supra* note 138.

¹⁴⁷ Although it should be noted that the opposition from Kern County was not so much of the use of biosolids for composting as of its application to farmland.

¹⁴⁸ See Ellis, *supra* note 141.

¹⁴⁹ See Cavanaugh, *supra* note 138.

¹⁵⁰ *Compost/Sewer*, *supra* note 92.

¹⁵¹ Cavanaugh, *supra* note 138.

¹⁵² *Id.*

the environment. “The city has done the most environmentally responsible option possible. If we can’t manage (our biosolids), if we’re cut off from the most reasonable and best method, then people will start to notice it. We’ll be left with only really, really expensive options.”¹⁵³ However, Kern County officials point out that cities are not only sending sludge to the San Joaquin Valley, but their prison inmates and hazardous waste, as well. “There is a general and growing sense in the region that we are becoming the dumping ground for things that the coastal regions don’t want,” said Carol Whiteside, president of the Great Valley Center, a think tank in Modesto. “I don’t think that there’s any requirement or inherent obligation that the valley take waste products from other regions. Every region should have to take care of its own waste... and exporting it to a region that is poor is inherently unfair.”¹⁵⁴ Los Angeles used to flush its sewage sludge in the ocean until 1987, when the practice was banned. Then, like most of the state’s urban areas, L.A. began sending its solids to landfills and farms. The city bought Green Acres Farm in 2000 for \$9.6 million and then spent \$35 million to upgrade its sewage treatment system to meet Kern County’s tough environmental standards.¹⁵⁵ At Hyperion Treatment Plant in Playa Del Rey, the human waste is heated to 131 degrees for 12 days to kill pathogens and garner the “Class A” designation. The result is crumbly, black muck that could be combined with other materials and sold as commercial fertilizer. Instead, the biosolids are loaded on trucks and hauled to the 4,688-acre farm south of Bakersfield, where it’s tilled into the soil to grow feed for farm animals.¹⁵⁶

“People think it’s all sloppy and messy to handle. This is not the stuff you flush down the toilet. This is treated to a high degree,” explained Diane Gilbert Jones, who is the Bureau

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ *Id.*

¹⁵⁶ *Compost/Sewer, supra* note 92.

of Sanitation's point person on biosolids. "If this was all bagged and we brought it here there would be no issue.",¹⁵⁷

Los Angeles does mix a small amount of treated sewage sludge in compost used in city landscaping. But Kern residents find inherent insult in the fact that Los Angeles sends 99.9 percent of its treated excrement to them.¹⁵⁸ "Los Angeles is saying, 'We won't put it on our land, but it's beneficial use to you,'" said state Sen. Dean Florez, who is leading the effort to ban biosolids.¹⁵⁹ Florez previously tried to ban the importation of sludge across county lines. When that legislation stalled, he launched the Keep Kern Clean initiative that would prohibit the land application of biosolids in unincorporated Kern County.¹⁶⁰

If Kern County voters approve the measure, Los Angeles would have about six months to find a new destination, most likely Arizona. Los Angeles County, Orange County and Oxnard also dump sludge in Kern County and would be impacted by the ban.¹⁶¹

Green Acres Farm sits atop a segment of a vast groundwater basin where San Joaquin Valley water agencies and the Metropolitan Water District of Southern California have stored \$10 trillion worth of water.¹⁶² Although officials haven't found any evidence that biosolids have tainted groundwater after 15 years of use, the Kern Water Agency doesn't want to take any chances.

"We just have to be very, very careful about preserving what is probably our most precious asset," said Gene Lundquist, a director of the Kern Water Agency. "We cannot allow our groundwater to become contaminated. It's easy to say now that nothing had been contaminated from sludge. Once it gets into groundwater it's very difficult to clean up.",¹⁶³ But Los Angeles officials

¹⁵⁷Cavanaugh, *supra* note 138.

¹⁵⁸*Id.*

¹⁵⁹*Compost/Sewer, supra* note 92.

¹⁶⁰Loughrie, *supra* note 92.

¹⁶¹Cavanaugh, *supra* note 138.

¹⁶²*Id.*

¹⁶³*See id.*

say much of the groundwater is destined for Southland taps and they're just as protective.

‘‘Why would we do anything that could even have the potential to damage our groundwater?’’

Gilbert Jones asked.¹⁶⁴

The city of Oxnard also owns land near Wasco, where it sends over 24,000 tons of treated sewage each year. In all, over 450,000 tons of sludge is shipped from Southern California up to the Central Valley each year.¹⁶⁵

Responses to and Critiques of the Continued Use of Biosolids on Food Crops

Among the reasons for concern, say critics, is the potential for the sludge farms to worsen the air pollution problems for the region. Three of the top four worst metropolitan areas most affected by smog and particle pollution are found in the Central Valley of California.¹⁶⁶ Only the Los Angeles region has worse air.¹⁶⁷ Sludge is known to create ozone. Moreover, wind could kick up sludge particles and add to the region's smog.¹⁶⁸

However, a recent study on the pollution contribution of cow manure suggests that these concerns may be overblown.¹⁶⁹ The study found that despite the horrible smells which they produce, it turns out that cows may not be quite the pollution-making machines they were purported to be. At least when it comes to smog-forming gases, the typical California dairy cow emits only half

¹⁶⁴*Id.*

¹⁶⁵See Juliana Barbassa, *Human Waste – Unsavory Import Raises Concern in Valley*, PORTERVILLE RECORDER, May 2, 2005, at 7A.

¹⁶⁶*Lung Association Ranks Most Polluted Cities*, CNN, Apr. 29, 2004, at <<http://www.cnn.com/2004/US/04/28/air.pollution/>> (last visited May 17, 2006). These three areas are Visalia-Porterville, Bakersfield, and Fresno, in that order.

¹⁶⁷*Id.*

¹⁶⁸*Id.*

¹⁶⁹See Lau, *supra* note 2.

the amount that state air regulators have been blaming on them, according to early results from the University of California, Davis, study. Moreover, it's not cow manure that gives off so much of the unwanted gases - rather, it's cow burps. "It has large implications," said Frank Mitloehner, the animal scientist and air-quality specialist who did the study. "It will change the way dairies are regulated in this state, I believe."¹⁷⁰

The implications of this study also suggest that the air pollution contribution of fermenting biosolids is similarly low. How much gas comes out of a cow is one of the most avant-garde questions in the field of air quality today. Thanks to a 2003 law, which removed age-old exemptions given to livestock operations, California is preparing for the first time to place controls on air pollution from farm animals.¹⁷¹

Mitloehner's study was funded by the U.S. Environmental Protection Agency and the San Joaquin Valley Air Pollution Control District. Mitloehner's measurements show a cow produces about 6.4 pounds of volatile organic compounds (VOCs) per year. VOCs are ingredients in the development of ground-level ozone, a scourge of Central Valley air. However, in their estimates, California air board staff have figured that a cow produces 12.8 pounds of VOCs a year - a flawed figure that was based upon a misinterpretation of a study done in 1938. Based on the faulty number, regulators projected that dairy cow waste would surpass passenger cars as a pollution source in the San Joaquin Valley by 2010.¹⁷²

As with many figures used in the field of biosolids, Patrick Gaffney, a state air pollution specialist, admitted that he knew the cow number was shaky, but it was the only figure the

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

¹⁷² *Id.*

agency had to work with, and he looked forward to receiving more reliable data.¹⁷³

The ongoing UC Davis study measures the gaseous output from a sampling of Holsteins, which are the predominant milk-producing cows in the state. The animals are kept for three days in special chambers in which researchers can measure their emissions, whether from their mouths, hindquarters or waste. Mitloehner said the most surprising finding so far is that when the cows are removed and their manure left behind, VOC levels drop to near background levels. ‘‘At the time that the animals were chewing their cud, when they were belching, we saw the peaks (in gas emissions),’’ he said. ‘‘That indicates the gases... are released when the animal ruminates.’’¹⁷⁴ Mitloehner’s idea is to test the gas-producing capacity of various dairy cow diets to try to find something that minimizes VOCs without compromising milk production. ‘‘I don’t know what kind of device you might come up with,’’ he said with a wry laugh. ‘‘Maybe some antacids.’’¹⁷⁵

The implications of this study seem to eliminate air pollution concerns for sludge farming, since the ruminating cow and its toxic burps are not part of the sludge farm process.

However, air pollution is not the only natural resource which some fear could be affected by sludge farming. In fact, water pollution is a much more realistic possibility. Just last

¹⁷³*See id.*

¹⁷⁴*Id.*

¹⁷⁵*Id.* Similar studies have been conducted on pigs to help determine ways to reduce their harmful and offensive odors. One study testing different hog feed shows promising results, as hogs fed experimental feeds have produced excrement with significantly reduced levels of ammonia and hydrogen sulfide, both of which help give swine manure its offensive smell. The Swine Environmental Research Building holds up to 720 hogs. Inside, sensors compare the emissions of hogs that are fed the new diets with those of swine in adjacent rooms being raised on traditional livestock feed. The research team is experimenting with feeds to tone down the smells with mixes that contain between 5 percent and 7 percent fiber. They’re also working with a genetically modified corn not yet commercially available. *See Livestock Scientists Aim to Tame the Smell of Hog Farms*, ASSOCIATED PRESS, June 20, 2005.

Another team of researchers has developed a genetically modified pig which has been engineered to digest grasses and hay (as cows and sheep do), reducing the energy-intensive use of corn as pig feed, and cutting by 75% the amount of phosphorous produced by the swine. *See Lee Silver, Why GM is Good for Us – Genetically Modified Foods May Be Greener than Organic Ones*, NEWSWEEK INTERNATIONAL, Mar. 20, 2006.

The results of these studies have important implications for the future of manure in general, and possibly for the use of human waste, as well.

year, researchers found male fish with eggs in their testes and female sex traits off the coast of Southern California.¹⁷⁶ The two reports found the changes in fish such as English sole and California halibut, both of which are bottom dwellers, in water near where sewage is released, said Dan Schlenk, an environmental scientist at the University of California, Riverside.¹⁷⁷ High levels of estrogen, both natural and man-made formulations used in birth control pills, are thought to cause such abnormalities in fish.¹⁷⁸ Estrogen makes its way into sewage water and then the ocean through women's excretions. Compounds that act like estrogen, found in certain industrial chemicals, have also been blamed for such changes.¹⁷⁹ "We might have other players in this game [such as DDT]," Schlenk said in an interview Monday. "[But w]e would guess they are primarily coming from waste water."¹⁸⁰ Indeed, water can be a carrier of many microorganisms including pathogenic strains of *Escherichia coli*, *Salmonella* spp., *Vibrio cholerae*, *Shigella* spp., *Cryptosporidium parvum*, *Giardia lamblia*, *Cyclospora cayetanensis*, *Toxoplasma gondii*, and the Norwalk and hepatitis A viruses. Even small amounts of contamination with some of these organisms can result in food borne illness.¹⁸¹

In a survey of waterborne disease outbreaks in the United States for the two-year period 1991-1992, 34 outbreaks were associated with drinking water supplies in which an estimated 17,464 persons became ill.¹⁸² *Cryptosporidium parvum*, *Giardia lamblia*, *Shigella sonnei*, and hepatitis A virus were each linked to at least one outbreak during this period. *Cryptosporidium parvum* contaminated the Milwaukee, Wisconsin public water supply in 1993, resulting in the largest outbreak of

¹⁷⁶ *DDT Suspected in Male Fish with Female Parts – Researcher Notes Banned Pesticide Is In Sewage Sediment Off California*, REUTERS, Nov. 16, 2005, at <<http://www.msnbc.msn.com/id/10068049/>> (last visited May 17, 2006).

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ See Guidance for Industry, *supra* note 18.

¹⁸² See Working Draft, *supra* note 52.

waterborne disease documented in the United States in which 403,000 people became ill.¹⁸³

In 1995, an outbreak of *Salmonella hartford*, *S. gaminara*, and *S. rubislaw* was associated with unpasteurized orange juice served at a theme park in Florida.¹⁸⁴ Although the cause of the contamination was not identified, at least one of the groves supplying oranges to the implicated processor irrigated with surface water that may have been contaminated. In 1995, an outbreak of *E. coli* infections involving at least 29 people in Montana was linked to leaf lettuce.¹⁸⁵ It is not known where the lettuce became contaminated. However, investigators noted that the lettuce was irrigated with surface water which may be more vulnerable to contamination (e.g., through run off).¹⁸⁶

In 1990, an outbreak of *Salmonella javiana* infections involving 176 cases in Illinois, Michigan, Minnesota, and Wisconsin, was epidemiologically linked to consumption of fresh tomatoes.¹⁸⁷

In 1993, 100 outbreak-associated cases of *Salmonella montevideo* infections were identified in Illinois, Michigan, Minnesota, and Wisconsin, and tomatoes were again implicated as the likely vehicle.¹⁸⁸ Tomatoes from both outbreaks were traced back to a single packing house. A water-bath used by the packer appeared to be the likely source of contamination and the most practical point for control.¹⁸⁹

These examples illustrate some of the difficulty in identifying the source of microbial contamination for fresh produce. Fresh produce with a relatively short shelf-life is often gone by the time an outbreak is reported, making it difficult to identify the item causing food borne illness.¹⁹⁰

¹⁸³ *Id.*

¹⁸⁴ See CDC EPI-AID 95-62.

¹⁸⁵ See CDC EPI-XID-95-68.

¹⁸⁶ See Working Draft, *supra* note 52.

¹⁸⁷ *Id.*

¹⁸⁸ See CDC EPI-93-79.

¹⁸⁹ See Working Draft, *supra* note 52.

¹⁹⁰ *Id.*

All of the stories and studies above lead to one great question: Why doesn't the federal government do more to oversee the use of biosolids on farmland? Animal manure and human fecal matter represent a significant source of human pathogens. Their use should be closely managed to limit the potential for pathogen contamination.¹⁹¹

Potential sources of contamination are varied. Contamination can occur as easily as having fecal matter left on an orchard floor being tracked via shoes onto ladder rungs, which then gets transferred to the produce when workers climb the rungs to pick fruit.¹⁹² Other considerations include prior land use, adjacent land use, field slope and drainage, water quality, worker hygiene, pest and vermin control, post-harvest handling, etc. Also, rainfall onto a pile of biosolids can result in leachate, potentially containing pathogens. For this reason, growers are encouraged to cover their biosolids piles.¹⁹³

Another potential source of contamination is from the equipment used to manage the biosolids, which are often subsequently used in produce fields. Therefore, equipment used to turn compost, and other multiple use equipment that contacts manure, should be cleaned (such as with high pressure water or steam sprays) before it contacts fresh produce. Growers should also be aware of other factors, such as farm layout and traffic flow, that may allow a tractor to drive through manure before entering a produce field.¹⁹⁴ A 2000 survey of 71 California fruit and vegetable shippers, who sell their products to all regions of the country, demonstrate that contaminated equipment should be a real case for concern, where 14 percent of the shippers reported that the physical condition of the trailer was not sufficiently clean.¹⁹⁵

¹⁹¹See Guidance for Industry, *supra* note 18.

¹⁹²See Safe Tables Our Priority, *supra* note 12.

¹⁹³Guidance for Industry, *supra* note 18.

¹⁹⁴*Id.*

¹⁹⁵California Agricultural Technology Institute, College of Agricultural Sciences and Technology, California State University, Fresno, Center for Agricultural Business, Part VII: Produce Trucking Perceptions (2000), at <http://www.cati.csufresno.edu/CAB/rese/99/990301/perceptions.htm>. See also FSIS, *FSIS Safety and Security Guide-*

Even the regulation that does exist gives rise to concern. For instance, while the EPA recommends composting processes for municipal waste water sludge to achieve a temperature of 131 to 149 degrees F for a period of at least three days, there is no more direct supervision once a treatment facility has received certification. Moreover, certification only requires that the sludge achieve a temperature at the low end of 131 degrees.¹⁹⁶ Thus, for many sludge farmers, it is not in the economic interest to seek temperatures greater than 131 degrees F, since higher temperatures indicate higher expense. Furthermore, many experts have indicated that proper manure management should be targeted between 140-149 degrees F.¹⁹⁷ Even the FDA itself has been inconsistent on its position regarding the required time and temperature for safe composting, even recommending temperatures of up to 170 degrees F for 15 days.¹⁹⁸ What is more, it has been shown that while temperatures 1 meter below the surface of a biosolids pile may exceed 149 degrees F, which is where most temperature readings are done, a layer just under the surface may in fact be below 95 degrees F.¹⁹⁹ Finally, it should be noted that some pathogens have a higher thermal threshold than others. For example, the Hepatitis A virus is not destroyed until temperatures reach approximately 176 degrees F,²⁰⁰ and Salmonella has been shown to survive for at least 8 days at 122-144 degrees F.²⁰¹

Several fresh fruit and vegetable trade organizations, universities, state and local government agencies, and countries exporting produce to the United States have taken strong leadership

lines for the Transportation and Distribution of Meat, Poultry and Egg Product, 68 Fed. Reg. 45, 7889 (Aug. 4, 2003) (providing suggested model guidelines for the transportation and distribution of meat, poultry and egg products developed by USDA's Food Safety and Inspection Service (FSIS)).

¹⁹⁶ See Standards for the Use or Disposal of Sewage Sludge, *supra* note 11.

¹⁹⁷ For multiple references, see Analysis and Evaluation, *supra* note 19.

¹⁹⁸ See *id.*

¹⁹⁹ See *id.*

²⁰⁰ See Working Draft, *supra* note 52.

²⁰¹ See Analysis and Evaluation, *supra* note 19 (including temperature requirements for other pathogens).

roles in assisting growers, packers, and shippers in identifying potential hazards associated with their operations.²⁰² These efforts have included the development of quality assurance programs, good manufacturing practices, and good agricultural and management practice guidance documents; funding of agriculture research studies; and sponsoring of educational initiatives.²⁰³

For instance, Karen Egbert, the Director of the Food Safety Program, while generally supportive of the FDA's intent to protect American produce from contamination, was nonetheless critical of its attempt to do so through mere voluntary participation.²⁰⁴ "We do not agree... that FDA can achieve this objective merely by 'promoting' the application of the voluntary Good Agricultural Practices (GAPs) and Good Manufacturing Practices (GMPs) and other guidance to fresh produce production as the agency proposes."²⁰⁵ Furthermore, while the FDA guidelines recommend that high temperatures be used to kill potential pathogens in biosolids, Egbert criticizes the failure to identify either a minimum temperature or minimum time for composting prior to field application.²⁰⁶ In her comments, Egbert notes that "many growers and producers still are either unaware of or are not complying with the guidance."²⁰⁷ As evidence of this, she points to an incident in February 2004 where FDA was forced to send a letter to firms that grow, pack, or ship fresh lettuce and/or fresh tomatoes reminding them to review their current operations in light of the agency's guidance.²⁰⁸ Furthermore, Egbert notes that at the June 29, 2004, public discussion of the proposed Product Action Plan, "Dr. Robert Gravani of Cornell University's Food Science Department reported that a Good Agricultural Practices Survey of Farm Workers in New York State

²⁰²See, e.g., Safe Tables Our Priority, *supra* note 12; Egbert, *supra* note 59.

²⁰³See generally Guidance for Industry, *supra* note 18.

²⁰⁴See Egbert, *supra* note 59.

²⁰⁵*Id.* at 3.

²⁰⁶*Id.* at 7.

²⁰⁷*Id.* at 3.

²⁰⁸Letter to Firms that Grow, Pack, or Ship Fresh Lettuce and Fresh Tomatoes, FDA, CFSAN (Feb. 5, 2004), at <<http://www.cfsan.fda.gov/~dms/prodltr.html>> (last visited May 17, 2006).

showed that approximately 30% of producers were unaware of GAPs for their particular crop.’’²⁰⁹ Egbert went on to offer a few recommendations for ways the FDA could improve its oversight over the use of biosolids. Among these recommendations include developing commodity-specific GAPs, especially for higher-risk products which have been linked to repeated outbreaks, such as tomatoes, lettuce, cantaloupes, green onions, herbs and sprouts.²¹⁰ Egbert suggests that the FDA could use best practices manuals developed by industry groups as a guide, such as that developed for field-cored lettuce.²¹¹ Egbert also recommends establishing a more comprehensive traceback system whereby officials could more quickly and easily identify the source of outbreaks before they spread.²¹² Finally, Egbert urges the FDA to make their guidelines mandatory and enforceable, or at the very least to exercise more rigorous oversight when adulterated products are sold.²¹³

Nancy Donley, President of Safe Table Our Priority (STOP), also submitted comments on the FDA food safety guidelines.²¹⁴ STOP is a nonprofit, grassroots organization consisting of victims of foodborne illness, family, friends and concerned individuals who recognize the threat pathogens pose in the U.S. food supply.²¹⁵ STOP’s mission is to prevent unnecessary illness and loss of life from pathogenic food borne illness.²¹⁶ They count among their members victims of E. coli contaminated lettuce and apple juice; hepatitis A-contaminated strawberries and green onions; and Salmonella-contaminated orange juice, almonds, spices like cilantro and tomatoes.²¹⁷ They claim that in all of these cases, the government’s efforts have been inadequate to sufficiently

²⁰⁹Egbert, *supra* note 59, at 4.

²¹⁰*Id.* at 5.

²¹¹See National Food Processors Association, International Fresh-cut Product Association, and United Fresh Fruit & Vegetable Association, “FC Lettuce” Best Practices (Apr. 23, 2001).

²¹²Egbert, *supra* note 59, at 7.

²¹³*Id.*

²¹⁴Safe Tables Our Priority, *supra* note 12.

²¹⁵*Id.* at 1.

²¹⁶*Id.*

²¹⁷*Id.*

warn consumers.²¹⁸

Like Egbert and the Food Safety Program, Donley emphasizes that the most important thing the government could do to ensure produce safety would be to enforce regulations, rather than offer mere voluntary guidelines.²¹⁹ Donley points out that the safety of the least safe producers can only be raised with regulations and on-farm inspections.²²⁰ That compliance is low is strongly suggested by a 1998 article in the Wall Street Journal, which indicated that over the previous five years, on average more than a third of inspected growers did not comply with state-mandated field sanitation regulations.²²¹

Donley further points out that even for foods that are always served cooked, and thus are sterilized before consumption, consumers would prefer that their foods not be contaminated with fecal matter.²²² Donley also highlights special concern over produce products that are combined or mixed -- such as juice, sprouts, chopped lettuce, coleslaw, and salsa -- and which have caused more produce outbreaks over the past 10 years than any single type of produce.²²³

Other recommendations offered by Donley include the development of a DVD on food safety for distribution to producers, the total ban of human biosolids on plants that are to be directly consumed by people, the setting and enforcement of strict water quality standards, and creation of a better food tracing mechanism with onsite daily inspection and testing of offender companies until underlying practices have been corrected.²²⁴ Finally, STOP recommends the creation of

²¹⁸ *Id.*

²¹⁹ *Id.* at 7.

²²⁰ *Id.* at 2.

²²¹ *Id.* at 7 (“These state regulations address such factors as the availability of clean toilets, toilet paper, soap, paper towels and fresh water for drinking and hand washing.”).

²²² *Id.* at 6.

²²³ *See id.*

²²⁴ *See id.* at 3. The letter explains that this DVD should include the following:

- data on outbreaks
- stories of the experiences of victims

a certification system, similar to one used in Europe and Africa called EuroGAP, whereby produce companies would be required to become certified in safety practices in order to distribute their foods.²²⁵

This isn't to say that the government has been ignoring the issue so much as that more needs to be done. For instance, one encouraging creative approach pursued by the FDA in 1999 was to sponsor a contest entitled 'Detection of Human Waste on Imported Fresh Fruits and Vegetables.'²²⁶ The contest challenged teams to develop mechanisms by which the FDA could better determine if sewage sludge had been adequately treated to eliminate pathogenic microorganisms and to determine if fresh fruits and vegetables had been contaminated on the surface by improper sewage sludge.²²⁷

Conclusion

It seems rather disturbing that no national regulations govern the use of human excrement as an 'amendment' on crops. I suspect that many people are not even aware of the practice, even though the majority of what we flush down our toilets and drains is eventually converted to this use. Yet, despite the many concerns and open questions which still exist regarding the continued use of biosolids on farmland, it seems unlikely that the government will impose

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- examples of what has happened to producers that have done the wrong thing
 - interviews with attorneys who sue on behalf of victims
 - interviews with domestic producers that are leading in food safety, detailing how food safety improvement have helped them deliver better quality product
 - interviews with retail customers that want to see safer food
 - examples of food safety practices in foreign countries that surpass practices in the United States, with interviews of producers explaining their beliefs in the need for stricter standards.

²²⁵ *Id.* at 19. See also www.eurep.org for more information on this program.

²²⁶ See Cooperative Agreement, *supra* note 30.

²²⁷ See *id.*

greater oversight over the practice until an outbreak actually occurs that can be traced to the use of biosolids on crops. And should such an outbreak occur, the lack of regulations in this area suggests that no food safety protection regulations would have been broken. The federal government should recognize the potential dangers of biosolids use, and dedicate more oversight to its use. While it may not be necessary to completely ban the practice, it is impossible to tell one way or another until more scientific studies are done to better identify safe practices. It seems quite unacceptable for the government to admit ignorance on one hand while claiming safety on the other. Thus, the first step should simply be to initiate more studies to affirmatively establish safe practices and procedures regarding the treatment, handling and use of biosolids.

Meanwhile, for those who choose to use biosolids on their fields, the burden should be placed on them to regularly monitor and report the safety levels of their operations. More precise standards for compliance should be set by the government, and a more regular certification process established. These standards should be continually updated as more data becomes available from greater research studies. Due to the nature of our national economy, and the wide distribution of our nation's produce, these standards and regulations cannot be simply left to the states.

I should hope that it doesn't take a health crisis for the government to seek precautionary measures to ensure the safe use of biosolids on farmland. Despite this concern, we should all certainly continue to enjoy our home-grown produce, which continues to be among the best in the world -- but it probably wouldn't be a bad idea to give it an extra wash and scrub just to be sure that yesterday's flush isn't part of today's breakfast.